Neurosurgical Forum LETTERS TO THE EDITOR

Grading scale for tuberculum sellae meningiomas

TO THE EDITOR: We read with great interest the article by Magill et al.⁵ (Magill ST, Morshed RA, Lucas CHG, et al: Tuberculum sellae meningiomas: grading scale to assess surgical outcomes using the transcranial versus transsphenoidal approach. *Neurosurg Focus* 44(4):E9, April 2018). We would like to congratulate the authors for their efforts in addressing the issue of tuberculum sellae meningiomas, which is of interest to all those dealing with this challenging entity. The decision-making process for the treatment of skull base meningiomas is complex and should take into consideration a variety of factors including tumor characteristics, patient characteristics, approach-related factors, and the experience of the surgical center. As is well known and emphasized by the authors, tuberculum sellae meningiomas have anatomical nuances that must be carefully considered before the appropriate treatment is chosen. Tumor size, extension, optic canal invasion, and vascular encasement are among the major factors that have been cited and should always be considered in the surgical decision-making. Therefore, the authors' attempt to develop a scoring system that may help in this should be applauded.

However, as with the other classification systems cited, the one the authors present in their paper is not perfect. We believe further discussion could answer some questions about the classification and help us to understand it more adequately. The selection of a cutoff for tumor size and optic canal invasion may require further discussion. Based on figures and descriptions in the paper, we understand that the tumor size cutoff was chosen based on previous anatomical studies,^{2,3} according to measurements of the interoptic distance. However, this is not necessarily the largest diameter of the lesion. Although we do agree that the interoptic distance is important, we believe that the largest tumor diameter should also be taken into consideration. "High" tumors with significant displacement of the optic chiasm are usually more challenging than small lesions. In our experience, we usually use a tumor size cutoff of 3 cm for classification of those lesions. Therefore, we believe the vertical length of the lesion should also be considered in the decision-making process.

Regarding optic canal invasion, it would be interesting if the authors could provide further explanation for the se-

lected cutoff of invasion. Additionally, although unusual, some of those tumors may present with invasion of the lateral part of the optic canal. This certainly limits the extent of resection (EOR) via an endoscopic endonasal approach and favors open approaches. Finally, the location and extent of the dural tail should be considered. As one of the goals of surgery in most cases is also to remove the affected dura, resection of the dural tail should be a goal. Considering this, lesions with lateral dural extensions to the anterior clinoid process or sphenoid wing are unlikely to be completely removed via an endoscopic endonasal approach.

Comparisons of outcomes following endoscopic or open approaches have been reported in different papers;^{4,6} however, the heterogeneous nature of the lesions studied and the different characteristics of the patients selected for each approach preclude any valid comparison of results. In reality, most studies compare apples to oranges. In this scenario, the development of a classification scheme that can help in the stratification of tuberculum sellae meningiomas is helpful. Magill et al. retrospectively applied their classification in the current study and thus it was not used for patient selection. In fact, as described in their paper, patients with large, more invasive tumors were usually surgically treated via a transcranial approach, whereas smaller tumors with lower scores were submitted to endoscopic endonasal surgery. This selection bias should be considered when interpreting the overall results of the study, especially in terms of visual outcomes and EOR. Additionally, one should consider that several different transcranial (pterional, orbitozygomatic, bifrontal) and transsphenoidal (endoscopic and microscopic) approaches were used. In their study, the only univariate predictor of a better or the same visual outcome was a tumor score of 1. An analysis of Fig. 5, however, suggests that postoperative visual worsening happened in only 2 cases after endoscopic surgery. Therefore, it is possible that better or the same visual outcomes may be associated with endoscopic approaches, a conclusion that will have to be confirmed in a larger study. Interestingly, it also shows that the better or same visual status was often observed even after subtotal tumor resection via an endoscopic endonasal approach. Regarding EOR, statistical analysis demonstrated that open approaches and a lower canal score were associated with gross-total resection (GTR). Although there is an overall superiority of open approaches for this goal, subgroup analysis in larger studies may demonstrate dif-

ferent results. As shown in Fig. 5, endoscopic endonasal approaches achieved GTR of most small lesions (1-0-0, 1-0-1, 1-1-0), and this subgroup is likely to have an EOR similar to that in open approaches. As recently reported by Bander et al., in a similar cohort of patients suitable for endoscopic or open approaches, EOR may be similar in both groups, whereas better visual outcomes may be observed in the endoscopic cohort.¹

Finally, we believe further studies will help to further define the advantages and disadvantages of endoscopic and open approaches for the resection of tuberculum sellae meningiomas. At this point, supported by the current results, endoscopic endonasal surgery should be reserved for selected small midline tuberculum meningiomas and performed in centers of excellence for endoscopic surgery. Open approaches remain the approach of choice for most meningiomas for the majority of surgeons.

Joao Paulo Almeida, MD
Fred Gentili, MD

Toronto Western Hospital, University of Toronto, ON, Canada

References

1. Bander ED, Singh H, Ogilvie CB, Cusick RC, Pisapia DJ, Tsiouris AJ, et al: Endoscopic endonasal versus transcranial approach to tuberculum sellae and planum sphenoidale meningiomas in a similar cohort of patients. **J Neurosurg** **128**:40–48, 2018
2. de Notaris M, Solari D, Cavallo LM, D'Enza AI, Enseñat J, Berenguer J, et al: The “suprasellar notch,” or the tuberculum sellae as seen from below: definition, features, and clinical implications from an endoscopic endonasal perspective. **J Neurosurg** **116**:622–629, 2011
3. Guthikonda B, Tobler WD Jr, Froelich SC, Leach JL, Zimmer LA, Theodosopoulos PV, et al: Anatomic study of the prechiasmatic sulcus and its surgical implications. **Clin Anat** **23**:622–628, 2010
4. Komotar RJ, Starke RM, Raper DM, Anand VK, Schwartz TH: Endoscopic endonasal versus open transcranial resection of anterior midline skull base meningiomas. **World Neurosurg** **77**:713–724, 2012
5. Magill ST, Morshed RA, Lucas CHG, Aghi MK, Theodosopoulos PV, Berger MS, et al: Tuberculum sellae meningiomas: grading scale to assess surgical outcomes using the transcranial versus transsphenoidal approach. **Neurosurg Focus** **44**(4):E9, 2018
6. Turel MK, Tsermoulas G, Yassin-Kassab A, Reddy D, Andrade-Barazarte H, Gonen L, et al: Tuberculum sellae meningiomas: a systematic review of transcranial approaches in the endoscopic era. **J Neurosurg Sci** [epub ahead of print], 2016

Disclosures

The authors report no conflict of interest.

Correspondence

Joao Paulo Almeida: jpaulocavalcante@yahoo.com.br.

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Response

We thank the authors for their letter regarding our pa-

per on a scoring system for tuberculum sellae meningiomas. They are correct in their observation that the system created by us was arbitrary and imperfect. We did use both anatomical and surgical information about these tumors to try to develop a simple method of looking at outcomes with a plan to roll it out to a much larger group around the world, which would increase our sample size and allow us to determine if there were prognostic information that might influence selection for the surgical approach. Having larger patient numbers would also facilitate more detailed subgroup analysis, which is the ultimate goal of the grading scale.

We selected the transverse diameter of the tumor as our size parameter using the inter-optic canal distance of 15 mm since with an endoscopic approach the internal carotid arteries may limit access to the lateral extent of the tumor more than the vertical length. It is possible that digitized volumes may be more important, but of course this is not as easy to do, although it should be considered in future studies. The authors may be right in their belief that the vertical dimension is more important than the transverse dimension, and I would encourage them to look at the influence of various tumor dimensions on outcome and let us know what they find.

As regards the extent of optic canal invasion, we did not try to quantify medial canal involvement since this is the most common pattern and there is a limit to the spatial resolution of MRI in order to measure this accurately. For larger tumors that involve the superior or lateral parts of the optic canal, I am quite certain that most of us would select a transcranial approach. Of course, these would be the tumors most difficult to resect completely without additional risk to vision.

As regards the dural tail, it would be hard to quantify and not all “dural tails” on imaging have pathologically confirmed tumor. I agree that extensions to the clinoid or sphenoid wing would not be tumors to approach endoscopically, and according to strict nomenclature, they would not be purely tuberculum sellae meningiomas but rather tumors involving multiple compartments. We are currently working on a standardized nomenclature to suggest to our colleagues in the AANS/CNS Section on Tumors and the North American Skull Base Society to help standardize the description of tumors, especially those in the “parasellar” region.

We struggled with how to incorporate some modifying factor for surgical bias in terms of the surgical approach. We certainly heard from other reviewers with an endoscopic bent that results may not be generalizable to the surgical community. We agree. We did ask our colleagues in Naples, the first to report on the technique, to include their endoscopic and transcranial approaches. A “power factor” may be created to describe the ratio of cases using both approaches to weight outcomes or complications.

This summer we will ask other major centers around the world to participate in a much larger study of tuberculum meningiomas using this scale, and we were planning to invite the Toronto group. We hope that increased numbers may provide better insights into the parameters associated with outcomes.

Finally, we agree with their statements that “endoscopic

endonasal surgery should be reserved for selected small midline tuberculum meningiomas and performed in centers of excellence for endoscopic surgery. Open approaches remain the approach of choice for most meningiomas for the majority of surgeons.” We thank them for their comments.

Michael W. McDermott, MD
University of California, San Francisco, CA

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